REMARKS

Claims 1-2, 7-15, and 17-30 have been amended, claims 3 and 16 have been cancelled, and new claims 31-36 have been added. Claims 1-2, 7-15, and 17-36 are pending, with claims 1, 7-8, 15, 22, and 27 being independent.

Attached hereto is an Appendix entitled "Version with Markings to Show Changes Made" which is a marked-up version of the portions of the application which have been amended by the present amendment, with brackets indicating deleted matter and underlining indicating added matter.

A preliminary amendment was filed on July 13, 1999, but the Office Action of October 11, 2001, does not indicate that the preliminary amendment of July 13, 1999, has been entered. Accordingly, it is respectfully requested that the Examiner specifically indicate on the record in the next Office communication that the preliminary amendment of July 13, 1999, has been entered.

The drawings were objected to in the Office Action of October 11, 2001, because the Examiner is of the opinion that Figs. 1-6 should be labeled "Prior Art".

Submitted herewith are corrected formal drawings which include the change to Fig. 24 in the proposed drawing correction of July 13, 1999, as required in item 11 on page 1 (the Office Action Summary) of October 11, 2001, and in which Figs. 1-6 have been labeled "Prior Art" as required by the Examiner on page 2 of the Office Action of October 11, 2001.

Accordingly, it is respectfully requested that the objection to the drawings be withdrawn.

New dependent claims 31-36 respectively depending from independent claims 1, 7-8, 15, 22, and 27 have been added to recite further features of the present invention.

Claims 14 and 25 were rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicants regard as the invention. This rejection is respectfully traversed insofar as it may be deemed to be applicable to claims 14 and 25 in their present form.

In explaining the rejection, the Examiner states as follows:

> Claim 14 lacks an antecedent basis in claim 8 for "said correction of brightness values". Claim 14 will be assumed to depend from claim 11, which does recite a correction of brightness values. Claim 25 lacks an antecedent basis in claim 22 for "said alignment means". Claim 25 will be assumed to depend from claim 24 which does recite an alignment means.

Claims 14 and 25 have been amended to respectively depend from claims 11 and 24 in accordance with the Examiner's comments. Accordingly, it is submitted that claims 14 and 25 are now in compliance with 35 USC 112, second paragraph, and it is respectfully requested that the rejection of claims 14 and 25 under 35 USC 112, second paragraph, be withdrawn.

Claims 15-16, 18, and 20 were rejected under 35 USC 102(b) as being anticipated by Wihl (U.S. Patent No. 4,633,504). The rejection of claim 16 has been rendered moot

by the cancellation of claim 16. The rejection of claims 15, 18, and 20 is respectfully traversed insofar as the rejection may be deemed to be applicable to claims 15, 18, and 20 in their present form and to new dependent claim 34 depending from independent claim 15.

Independent claim 15 now recites an apparatus for inspecting defects of patterns, comprising image pick-up means for picking up a first pattern formed on a substrate and a second pattern that is also formed on the substrate so as to have naturally the same shape as the first pattern, thereby producing a first image of the first pattern and a second image of the second pattern, storage means for storing the first image, alignment means for aligning the stored first image and the second image with an accuracy of one pixel unit, local gradation conversion means for performing local gradation conversion to correct a brightness of at least one of the stored first image and the second image, defect detection means for comparing the aligned first and second images, at least one of which has a brightness which has been corrected by the local gradation conversion means, thereby detecting defects of the patterns, and output means for producing information of the defects of the patterns detected by the defect detection means.

New dependent claim 34 recites an apparatus according to claim 15, wherein the local gradation conversion minimizes a sum of squares of differences between a brightness of the first image and a brightness of the second image within each

of a plurality of local areas of the first image and the second image.

It is submitted that Wihl does not disclose or suggest at least the features of claims 15 and 34 which are underlined above.

Since Wihl does not disclose the features of claims 15 and 34 discussed above, it is submitted that claims 15 and 34 and claims 18 and 20 depending from claim 15 patentably distinguish over Wihl in the sense of 35 USC 102(b), and it is respectfully requested that the rejection of claims 15, 18, and 20 under 35 USC 102(b) as being anticipated by Wihl be withdrawn.

Claims 1, 4, 8-14, and 22-26 were rejected under 35 USC 102(e) as being anticipated by Lee et al. (Lee) (U.S. Patent No. 5,808,735). This rejection is respectfully traversed insofar as it may be deemed to be applicable to claims 1, 4, 8-14, and 22-26 in their present form and to new dependent claims 31, 33, and 35 respectively depending from independent claims 1, 8, and 22.

Independent claim 1 now recites a method of inspecting patterns, comprising the steps of picking up a first pattern formed on a substrate to produce a first image, storing the first image, picking up a second pattern that is also formed on the substrate so as to have naturally the same shape as the first pattern, thereby producing a second image, aligning the stored first image and the second image with an accuracy of one pixel unit, performing local gradation conversion of at

least one of the stored first image and the second image to locally match a brightness of the first image with a brightness of the second image, and comparing the first and second images aligned and locally matched in brightness to detect a defect of the patterns.

Independent claim 8 now recites a method of inspecting a pattern, comprising the steps of comparing a first image produced by picking up a first pattern formed on a substrate and a second image produced by picking up a second pattern that is formed on the substrate so as to have naturally the same shape as the first pattern after at least one of the first image and the second image has been subjected to local gradation conversion and the first image and the second image have been aligned with an accuracy of one pixel unit, thereby extracting defects to be proposed, and obtaining certainty information of the extracted proposed defects, detecting a true defect from the extracted proposed defects, and producing information of the detected true defect.

Independent claim 22 now recites an apparatus for inspecting defects of a plurality of patterns formed on a substrate so as to have naturally the same shape, comprising table means on which the substrate is placed, and which can be moved in an X-Y plane, image pick-up means for picking up the patterns of the substrate placed on the table means to produce images of the patterns, proposed-defects extracting means for processing the images of the patterns when the substrate placed on the table means is continuously moved after at least

one of the images of the patterns has been subjected to local gradation conversion and the images of the patterns have been aligned with an accuracy of one pixel unit, thereby extracting proposed defects of the patterns, defect detection means for detecting true defects from the proposed defects of the patterns that have been extracted by the proposed-defects extraction means, and output means for producing information of the true defects detected by the defect detection means.

New dependent claim 31 recites a method according to claim 1, wherein the local gradation conversion minimizes a sum of squares of differences between the brightness of the first image and the brightness of the second image within each of a plurality of local areas of the first image and the second image.

New dependent claim 33 recites a method according to claim 8, wherein the local gradation conversion minimizes a sum of squares of differences between a brightness of the first image and a brightness of the second image within each of a plurality of local areas of the first image and the second image.

New dependent claim 35 recites an apparatus according to claim 22, wherein the local gradation conversion minimizes a sum of squares of differences between a brightness of one of the images of the patterns stored in the storage means and a brightness of one of the images of the patterns produced by the image pick-up means within each of a plurality of local areas of the one of the images of the patterns stored in the

storage means and the one of the images of the patterns produced by the image pick-up means.

It is submitted that Lee does not disclose at least the features of claims 1, 8, 22, 31, 33, and 35 which are underlined above.

Since Lee does not disclose the features of independent claims 1, 8, 22, 31, 33, and 35 discussed above, it is submitted that claims 1, 8, 22, 31, 33, and 35 and claims 4, 9-14, and 23-26 depending from claims 1, 8, and 22 patentably distinguish over Lee in the sense of 35 USC 102(e), and it is respectfully requested that the rejection of claims 1, 4, 8-14, and 22-26 under 35 USC 102(e) as being anticipated by Lee be withdrawn.

Claims 1, 3, 5, 7, 15, 21, and 27-29 were rejected under 35 USC 103(a) as being unpatentable over Lebeau (U.S. Patent No. 5,204,910) in view of Kobayashi et al. (Kobayashi) (U.S. Patent No. 4,669,123).

Claims 6, 19, and 30 were rejected under 35 USC 103(a) as being unpatentable over Lebeau in view of Kobayashi and Wagner et al. (Wagner) (U.S. Patent No. 5,659,172).

Claims 2 and 17 were rejected under 35 USC 103(a) as being unpatentable over Lebeau in view of Kobayashi and Haskell et al. (Haskell) (U.S. Patent No. 6,111,596).

The rejection of claim 3 has been rendered moot by the cancellation of claim 3. The rejections of claims 1-2, 5-7, 15, 17, 19, 21, and 27-30 are respectfully traversed insofar as they may be deemed to be applicable to claims 1-2, 5-7, 15,

17, 19, 21, and 27-30 in their present form and to new claims 31, 34, and 36 respectively depending from independent claims 1, 15, and 27.

Independent claim 1 now recites a method of inspecting patterns, comprising the steps of picking up a first pattern formed on a substrate to produce a first image, storing the first image, picking up a second pattern that is also formed on the substrate so as to have naturally the same shape as the first pattern, thereby producing a second image, aligning the stored first image and the second image with an accuracy of one pixel unit, performing local gradation conversion of at least one of the stored first image and the second image to locally match a brightness of the first image with a brightness of the second image, and comparing the first and second images aligned and locally matched in brightness to detect a defect of the patterns.

Independent 15 now recites an apparatus for inspecting defects of patterns, comprising image pick-up means for picking up a first pattern formed on a substrate and a second pattern that is also formed on the substrate so as to have naturally the same shape as the first pattern, thereby producing a first image of the first pattern and a second image of the second pattern, storage means for storing the first image, alignment means for aligning the stored first image and the second image with an accuracy of one pixel unit, local gradation conversion means for performing local gradation conversion to correct a brightness of at least one

of the stored first image and the second image, defect detection means for comparing the aligned first and second images, at least one of which has a brightness which has been corrected by the local gradation conversion means, thereby detecting defects of the patterns, and output means for producing information of the defects of the patterns detected by the defect detection means.

Independent claim 27 now recites an apparatus for inspecting defects of patterns, comprising image pick-up means for picking up a first pattern formed on a substrate and a second pattern that is formed on the substrate so as to have naturally the same shape as the first pattern, thereby producing a first image of the first pattern and a second image of the second pattern, storage means for storing the first image, defect detection means for correcting at least one of the stored first image and the second image by at least performing local gradation conversion of at least one of the stored first image and the second image and aligning the stored first image and the second image with an accuracy of one pixel unit, comparing the first image and the second image to detect defects after the at least one of the stored first image and the second image has been corrected, and then estimating information of the detected defects, and display means for displaying on a screen the defects detected by the defect detection means, and the information of the detected defects.

New dependent claim 31 recites a method according to claim 1, wherein the local gradation conversion minimizes a sum of squares of differences between the brightness of the first image and the brightness of the second image within each of a plurality of local areas of the first image and the second image.

New dependent claim 34 recites an apparatus according to claim 15, wherein the local gradation conversion minimizes a sum of squares of differences between a brightness of the first image and a brightness of the second image within each of a plurality of local areas of the first image and the second image.

New dependent claim 36 recites an apparatus according to claim 27, wherein the local gradation conversion minimizes a sum of squares of differences between a brightness of the first image and a brightness of the second image within each of a plurality of local areas of the first image and the second image.

It is submitted that Lebeau, Kobayashi, Wagner, and Haskell do not disclose or suggest at least the features of claims 1, 15, 27, 31, 34, and 36 which are underlined above.

Since Lebeau, Kobayashi, Wagner, and Haskell do not disclose or suggest the features of claims 1, 15, 27, 31, 34, and 36 discussed above, it is submitted that claims 1, 15, 27, 31, 34, and 36 and claims 2, 5-7, 17, 19, 21, and 28-30 depending from claims 1, 15, and 27 patentably distinguish over Lebeau, Kobayashi, and Haskell in the sense of 35 USC

1103(a), and it is respectfully requested that the rejections of claims 1-2, 5-7, 15, 17, 19, 21, and 27-30 under 35 USC 103(a) as being unpatentable over Lebeau, Kobayashi, Wagner, and Haskell be withdrawn.

Although dependent claims 2, 4-7, 9-14, 17-21, 23-26, and 28-30 are considered to be allowable by virtue of their dependency from allowable claims 1, 8, 15, 22, and 27, it is noted that these dependent claims also recite further features of the present invention which are not seen to be disclosed or suggested by the prior art.

As recognized by the Examiner, the other references cited but not relied upon neither disclose nor suggest the present invention, and thus no further discussion of these other references is deemed necessary at this time.

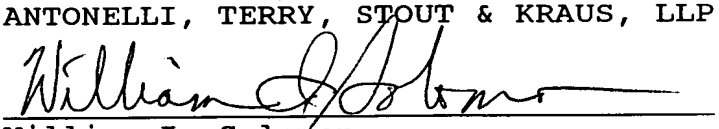
It is submitted that all of the Examiner's objections and rejections have been overcome, and that the application is now in condition for allowance. Reconsideration of the application and an action of a favorable nature are respectfully requested.

To the extent necessary, the applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any

overpayment of fees, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (500.37149X00).

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP



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Attachment

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

Changes made to the application by the present amendment are indicated below, with brackets indicating deleted matter and underlining indicating added matter.

IN THE CLAIMS

Claims 3 and 16 have been cancelled.

Claims 1-2, 4-15, and 17-30 have been amended as follows:

--1. (Amended) A method of inspecting patterns, comprising the steps of:

picking up a first pattern formed on a substrate to produce a first image;

storing [said] the first image;

picking up a second pattern that is also formed on [said] the substrate so as to have naturally the same shape as [said] the first pattern, thereby producing a second image;

aligning the stored first image and the second image with an accuracy of one pixel unit;

[correcting] performing local gradation conversion of at least one of [said] the stored first image and [said] the second image to locally match [the] a brightness of [said] the first image with [that] a brightness of [said] the second image; and

comparing [said] the first and second images aligned and locally matched in brightness to detect a defect of [said] the patterns.

2. (Amended) A method according to claim 1, wherein [said] the step of [matching] performing local gradation conversion of at least one of the stored first image and the second image to locally match the brightness of [said] the first image with [that] the brightness of [said] the second image is [executed] performed by means of a linear conversion having a gain and an offset so that the brightness of [said] the first image can be made substantially equal to [that] the brightness of [said] the second image.--

--4. (Amended) A method according to claim 1, wherein [the] a surface of [said] the substrate is covered with an optically transparent film;[,] and [the]

wherein a surface of [said] the optically transparent film is processed to be flat.

5. (Amended) A method according to claim 1, wherein [said] the step of picking up [said] the first [image] pattern and [said] the step of picking up [said] the second [image] pattern are [executed] performed optically.

6. (Amended) A method according to claim 1, wherein [said] the step of picking up [said] the first [image] pattern and

[said] the first pattern after at least one of the first image and the second image has been subjected to local gradation conversion and the first image and the second image have been aligned with an accuracy of one pixel unit, thereby extracting defects to be proposed, and obtaining certainty information of [the certainty of said] the extracted proposed defects;

detecting a true defect from [said] the extracted proposed defects; and

producing information of [said] the detected true defect.

9. (Amended) A method according to claim 8, wherein [said] the certainty information of [said] the extracted proposed defects is formed of a degree of inconsistency between [said] the first and second images that results from comparing [said] the first and second images, and a reliability of [said] the degree of inconsistency.

10. (Amended) A method according to claim 8, wherein [said] the certainty information of [said] the extracted proposed defects is [the] information produced based on [the basis of] at least [any] one of [the] a brightness, a local contrast, and a local average of each of [said] the first and second images.

[said] the step of picking up [said] the second [image] pattern are [executed] performed by use of an electron beam.

7. (Amended) A method of inspecting a pattern, comprising the steps of:

picking up a first pattern formed on a substrate to produce a first image;

storing [said] the first image;

picking up a second pattern that is formed on [said] the substrate so as to have naturally the same shape as [said] the first pattern, thereby producing a second image;

[correcting] performing local gradation conversion of at least one of [said] the stored first image and [said] the second image and aligning the stored first image and the second image with an accuracy of one pixel unit, and then comparing [said] the first and second images to detect a defect and to obtain features of [said] the detected defect; and

displaying information of [said] the features of [said] the detected defect on a screen.

8. (Amended) A method of inspecting a pattern, comprising the steps of:

comparing a first image produced by picking up a first pattern formed on a substrate and a second image produced by picking up a second pattern that is formed on [said] the substrate so as to have naturally the same shape as

11. (Amended) A method according to claim 8, [wherein said step of detecting said proposed defects includes a step] further comprising the steps of:

storing [said] the first image produced by picking up [said] the first pattern;[, a step of]

aligning [said] the stored first image [with said] and the second image produced by picking up [said] the second pattern[, a step of correcting the] with an accuracy of one pixel unit; and

performing local gradation conversion of at least one of the stored first image and the second image to correct brightness values of the at least one of the [said aligned] stored first image and the second image; [images, and a]

wherein the comparing step includes the step of comparing [said] the aligned first and second images, [with their] at least one of which has brightness values which have been corrected by performing local gradation conversion, to detect defects including [said] the proposed defects.

12. (Amended) A method according to claim 11, wherein [said alignment between said] the step of aligning the stored first image and the second [images] image is performed for each [pixel] of a plurality of pixels of the stored first image and the second image.

13. (Amended) A method according to claim 8, wherein [said] the substrate is a semiconductor wafer;

wherein the semiconductor wafer has a surface covered with an optically transparent film;[,] and [the] wherein a surface of [said] the optically transparent film is processed to be flat.

14. (Amended) A method according to claim [8] 11, wherein [said correction of said brightness values of said] the step of performing local gradation conversion of at least one of the stored first image and the second [images] image is performed [for] within each of a plurality of local [area] areas of the at least one of the stored first image and the second image.

15. (Amended) An apparatus for inspecting defects of patterns, comprising:

image pick-up means for picking up a first pattern formed on a substrate and a second pattern that is also formed on [said] the substrate so as to have naturally the same shape as [said] the first pattern, thereby producing a first image of [said] the first pattern and a second image of [said] the second pattern;

storage means for storing [said] the first image; [picked up by said image pick-up means;]

alignment means for aligning the stored first image and the second image with an accuracy of one pixel unit;

[brightness] local gradation conversion means for [converting the] performing local gradation conversion to

correct a brightness of [any] at least one of [said] the stored first image [stored in said storage means] and [said] the second image; [picked up by said image pick-up means;]

defect detection means for comparing [said] the aligned first and second images, at least [any] one of which [is converted in its] has a brightness which has been corrected by the local gradation conversion means, thereby detecting defects of [said] the patterns; and

output means for producing information of [said] the defects of [said] the patterns detected by [said] the defect detection means.--

--17. (Amended) An apparatus according to claim 15, wherein [said brightness] the local gradation conversion means [converts the] corrects brightness values of [said] the at least one of the first and second images [being compared] so as to [make them substantially equal] locally match a brightness of the first image with a brightness of the second image by performing a linear conversion having a gain and an offset.

18. (Amended) An apparatus according to claim 15, wherein [said] the image pick-up means optically picks up [said] the first pattern and [said] the second pattern.

19. (Amended) An apparatus according to claim 15, wherein [said] the image pick-up means picks up [said] the first

pattern and [said] the second pattern by use of an electron beam.

20. (Amended) An apparatus according to claim 15, wherein [said] the output means displays on a screen [the] information of a brightness, a local contrast, or a local average of [said] the first and second images.

21. (Amended) An apparatus according to claim 15, [further comprising shift correction means for correcting the positional shift between said first and second images with an accuracy of pixel unit, and] wherein [said brightness] the local gradation conversion means [converts] corrects the brightness of the at least [any] one of [said] the stored first image and the second [images of which the shift has been corrected] image after the alignment means has aligned the stored first image and the second image with [an] the accuracy of one pixel unit. [by said shift correction means.]

22. (Amended) An apparatus for inspecting defects of a plurality of patterns formed on a substrate so as to have naturally the same shape, comprising:

table means on which [said] the substrate is placed, and which can be moved in an X-Y plane;

image pick-up means for picking up [said] the patterns of [said] the substrate placed on [said] the table means to produce images of the patterns;

proposed-defects extracting means for processing [said] the images of [said] the patterns [that are picked up by said pick-up means] when [said] the substrate placed on [said] the table means is continuously moved after at least one of the images of the patterns has been subjected to local gradation conversion and the images of the patterns have been aligned with an accuracy of one pixel unit, thereby extracting proposed defects of [said] the patterns;

defect detection means for detecting true defects from [said] the proposed defects of [said] the patterns that have been extracted by [said] the proposed-defects extraction means; and

output means for producing [the] information of the true defects detected by [said] the defect detection means.

23. (Amended) An apparatus according to claim 22, wherein [said] the proposed-defects extraction means further estimates [the] certainty information of [certainty of said] the extracted proposed defects based on [the basis of] at least [any] one of a brightness, a local contrast, and a local average of [said] the images of the patterns.

24. (Amended) An apparatus according to claim 22, further comprising:

storage means for storing the images of [said] the patterns [picked up] produced by [said] the image pick-up means;

alignment means for aligning [said pattern image] the images of the patterns stored in [said] the storage means and [said] the images of the patterns [picked up] produced by [said] the image pick-up means with an accuracy of one pixel unit; and

local gradation correction means for correcting [the gradations] a brightness of [said] at least one of the images aligned by [said] the alignment means;[, and]

wherein [said] the proposed-defects extraction means extracts the proposed defects of [said] the patterns [by use of said pattern] from the aligned images, [corrected in gradation] at least one of which has a brightness which has been corrected by [said] the local gradation [correction] conversion means, and estimates [the] certainty information of [certainty of said] the extracted proposed defects.

25. (Amended) An apparatus according to claim [22] 24, wherein [said] the alignment means aligns [said pattern] the images of the patterns stored in [said] the storage means and [picked up] the images of the patterns produced by [said] the image pick-up means [to match for] with an accuracy of one pixel unit within each of a plurality of small [division] divisions of [said] the images of the patterns.

26. (Amended) An apparatus according to claim 24, wherein [said] the local gradation [correction] conversion means corrects [the gradations] a brightness of [each local parts of

said pattern] the at least one of the images aligned by the alignment means within each of a plurality of local areas of the at least one of the images aligned by the alignment means. [stored in said storage means and picked up by said image pick-up means.]

27. (Amended) An apparatus for inspecting defects of patterns, comprising:

image pick-up means for picking up a first pattern formed on a substrate and a second pattern that is formed on [said] the substrate so as to have naturally the same shape as [said] the first pattern, thereby producing a first image of [said] the first pattern and a second image of [said] the second pattern;

storage means for storing [said] the first image; [picked up by said image pick-up means;]

defect detection means for correcting at least one of [said second image and said] the stored first image [stored in said storage means] and the second image by at least performing local gradation conversion of at least one of the stored first image and the second image and aligning the stored first image and the second image with an accuracy of one pixel unit, comparing [said] the first image and [said] the second image to detect defects after the at least one of the stored first image and the second image has been corrected, and then estimating information of [said] the detected defects; and

display means for displaying on a screen [said] the defects detected by [said] the defect detection means, and the information of [said] the detected defects.

28. (Amended) An apparatus according to claim 27, wherein said defect detection means [has] includes:

alignment means for aligning the stored first image and the second image with an accuracy of one pixel; and

local gradation conversion means for performing local gradation conversion to correct a brightness [correction portion for correcting the brightness] of at least one of [said] the stored first image and the second image; [images, and said]

wherein the defect detection means compares [said] the aligned first and second images, at least one of which has [been corrected for its] a brightness [by said brightness correction portion] which has been corrected by the local gradation conversion means, thereby detecting [said] the defects.

29. (Amended) An apparatus according to claim 27, wherein [said] the image pick-up means optically picks up [said] the first and second patterns.

30. (Amended) An apparatus according to claim 27, wherein [said] the image pick-up means picks up [said] the first and second patterns by use of an electron beam.--

New claims 31-36 have been added as follows:

--31. (New) A method according to claim 1, wherein the local gradation conversion minimizes a sum of squares of differences between the brightness of the first image and the brightness of the second image within each of a plurality of local areas of the first image and the second image.

32. (New) A method according to claim 7, wherein the local gradation conversion minimizes a sum of squares of differences between a brightness of the first image and a brightness of the second image within each of a plurality of local areas of the first image and the second image.

33. (New) A method according to claim 8, wherein the local gradation conversion minimizes a sum of squares of differences between a brightness of the first image and a brightness of the second image within each of a plurality of local areas of the first image and the second image.

34. (New) An apparatus according to claim 15, wherein the local gradation conversion minimizes a sum of squares of differences between a brightness of the first image and a brightness of the second image within each of a plurality of local areas of the first image and the second image.

35. (New) An apparatus according to claim 22, wherein the local gradation conversion minimizes a sum of squares of differences between a brightness of one of the images of the patterns stored in the storage means and a brightness of one of the images of the patterns produced by the image pick-up means within each of a plurality of local areas of the one of the images of the patterns stored in the storage means and the one of the images of the patterns produced by the image pick-up means.

36. (New) An apparatus according to claim 27, wherein the local gradation conversion minimizes a sum of squares of differences between a brightness of the first image and a brightness of the second image within each of a plurality of local areas of the first image and the second image.--